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were dead. At this time the plants under the other glasses were perfectly healthy and sensitive; but there was a great inequality of development among them. The white had made great progress, the red less, the yellow little less still; the violet and the blue did not appear to have grown at all. After sixteen days the vigorous plants from the uncolored glass were removed to the green; in eight days they had become less sensitive, in two more the sensitiveness had almost entirely disappeared, and in another week they were all dead. Green rays of light appear to have no greater influence on vegetation than complete absence of light, and M. Bert believes that the sensitive plants exhibit only the same phenomena as all plants colored green, but to an excessive degree.—A. W. B.

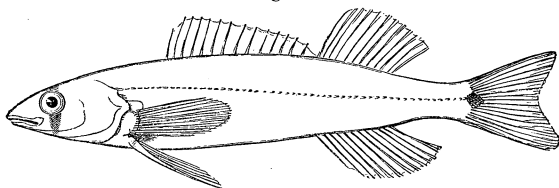
STRUCTURE OF THE CLOSED FLOWERS OF IMPATIENS.—At a meeting of the Linnæan Society of London held November 16th, Mr. A. W. Bennett read a paper on the above subject, his observations, made on *Impatiens fulva* Nutt., an American species completely naturalized in several places in the south of England, being substantially in accordance with those recorded by Prof. Asa Gray in his "Genera Flora America boreali-orientalis." Mr. Bennett, however, believes that the closed or "cleistogenous" self-fertilized flowers are not the result of "arrested development," but are from the first of a different nature, and he suggests that the "cap" formed by the unexpanded calyx and corolla may be thrown off the pistil by the elasticity of the stamens, which are of a very different shape and structure from those in the perfect flowers. The anthers do not dehisce, but the pollen, the quantity of which is very small, pierces with its tubes the wall of the anther in order to reach the stigma. The plant does not appear to be visited by insects in England; the conspicuous flowers, in which there is a provision to prevent the pollen reaching the stigma consequently seldom produce pods, while the unopened flowers do so abound invariably.—A. W. B.

ZOOLOGY.

THE ETHEOSTOMOIDS.—Having been for several years specially interested in this little group of Percoids, of which I am now engaged in completing a monograph, and wishing to secure

all the material possible before publishing the work, I take this means of asking all who are willing to give their aid to collect specimens for me. The specimens already in my hands consist of the large collections belonging to the Smithsonian Institution and the Museum of Comparative Zoology, the smaller collections of the Boston Society of Natural History and Peabody Academy of Science, and many type specimens received from Prof. Cope

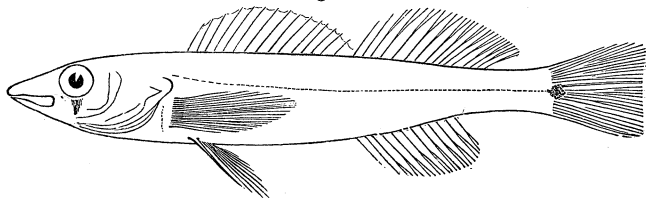
Fig. 3.

*Hadropterus.*

and Dr. Abbott. Besides these, all the types of Girard of the specimens described in the Pacific Railroad and Mexican Boundary Surveys, the types of Agassiz' species and such as still exist of Haldemann's and Storer's have been carefully studied. From this material about forty species have been recognized and several others are indicated by single specimens.

The great variation between individuals of the same species makes it essential to have a large number of specimens from as

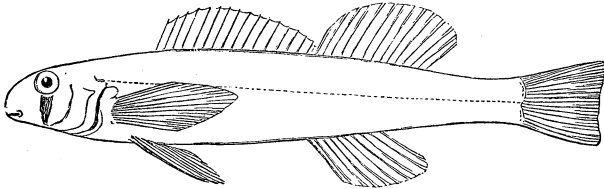
Fig. 4.

*Percina.*

many localities as possible in order to determine the species with any degree of certainty. Especially is this variation noticeable between males, females and young, and between males and females at the spawning time and those taken later in the season. In early spring the males of many of the species are most brilliantly arrayed in blue, orange, red, and other bright colors, while in summer and fall these colors are entirely lost or greatly changed. In many species where the males show a decided difference of

coloration from each other the females will be so similar in their plain markings as to make it almost impossible to separate them. There is also considerable variation in the shape of the fins between the males and females of some species, especially noticeable in the genus *Catonotus*, in which the spiny dorsal fin of the male is short and each ray usually terminates in a little knob, while in the female the rays are longer, and are without the

Fig. 5.

*Hyostoma.*

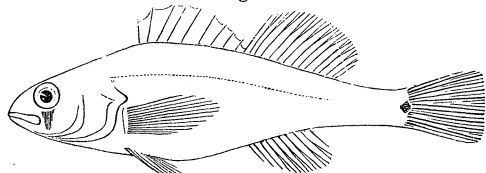
knob. Pages could be written on the variations which individuals of the different species exhibit when a large number of any one species has been carefully examined, but enough has been said here to call attention to the necessity of securing all the material possible for the work on which I am engaged.

These small fishes have the general appearance of young perch, and combine the habits of the perches with those of the little fresh water bull heads (Cottoids) or "miller's thumbs" as they are called in England.

They are found in nearly all locations, including lakes, ponds, rivers, small streams and ditches.

The sandy and gravelly shores of lakes

Fig. 6.

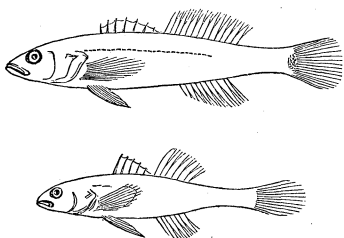
*Pœciliichthys.*

and ponds are favorite spots, as well as the grass and weed grown shallow parts of rivers, or the clear rocky stream. Several of the species are in great part surface swimmers, but by far the larger number pass most of their time on the bottom, darting about from stone to stone or in and out among the water plants. From this habit of moving by quick, short, and often zig-zag darts they have received the common and very appropriate name of "darters," and in many localities are well known under that name. A few

of the species attain four or five inches in length, but by far the larger number never exceed three inches, and many not over one and one-half to two inches. The outline cuts here given (Figs. 3-8) are all of natural size and roughly exhibit several of the more prominent forms.

These little fellows are generally quite difficult to catch until one gets familiar with their ways of darting about, but with a little practice and some patience they can be secured with a hand net or by driving them into a set net. But the way to catch them in large numbers is by drawing a seine, with very small meshes, along the banks of a lake, pond, or river, or up a narrow stream. In this way I have often succeeded in obtaining from four or five to forty or fifty specimens at a single haul of a fifty foot seine on the sandy shores of Lake Champlain. In August last, when fishing on the Wabash River, very successful hauls were made

Figs. 7 and 8.



Catnotus. Microperca.

by dragging a fifteen foot seine along the shallow banks of the river over the water plants, which was easily done by one person wading up stream in about two or three feet of water, holding down one end of the seine and another person holding the seine down at the other end, in such a way as to let it bag considerably down stream, and every now and then

dragging the seine ashore. In this mode of fishing care must be taken to keep the lead line well down on the bottom or the fishes will dart under. To a person who has never tried seining in this way a few hours of such collecting will secure to him more specimens of all that swim in the locality than he has thought it possible to obtain. A very successful way of collecting these darters, if you only have a scoop net, is to scoop about among the water plants, or over a muddy, leafy, or stony bottom, stirring up the bottom and getting the water so clouded as to confuse the fish, and by going backwards and forwards over the ground and every few moments emptying your net, many specimens may often be secured.

The Etheostomoids are widely distributed in the fresh waters of North America east of the Rocky Mountains, and I now have specimens taken from Hudson's Bay to Georgia. The species in

New England are very limited, only two or three having as yet been found, but in the central, north-western and southern states they are far more numerous, and the Ohio valley seems from present data to be the great centre of distribution of the group.

The method of preserving fishes is looked upon by persons not familiar with collecting as a difficult operation, and has always been a "bugbear" in the way of securing specimens of the class. I therefore offer the following simple means of preserving any small fish. If you intend collecting largely and are provided with a small seine or good hand or minnow net, it is best to go well prepared with vessels in which to place your captures, and for this purpose any strong bottles, jars or cans answer well. Pickle jars with good corks, or some of the patent preserve jars or cans are excellent, and handy to carry in basket, bag or pocket. Always, when you start out, have the collecting jars about one-third or one-half full of alcohol or unrectified whiskey (high wines), or if these can not be had readily, take common drinking whiskey or almost any spirit, as a substitute. When you get the specimens put them at once into the spirit before they have a chance to harm their fins and scales by thrashing about in the net or on the shore. It is always my plan to put the specimens I want to preserve *immediately* into my collecting jars from the net, not allowing them the slightest chance to get injured, and as the alcohol kills them almost instantly they are not harmed by dying, as is the case when left to die on land or in a pail of water as is so often done. By pursuing this course any fishes captured at the same time, and not wanted, can be returned to the river. When one wishes to study any species alive, the best way is to put two or three specimens only in a jar or pail to take home for the purpose, for if more are placed in one jar they will almost invariably die before being able to reach home with them.

While collecting you can fill your jars to the brim with specimens, provided you put them in alive and tip the jars as they are filled so that the spirits will come in immediate contact with the specimens as they are put in, but after you get home it is best either to add more spirit to the jar, or if weak spirits have been used pour it all off and fill the jar as full as you can with specimens without jamming them and then pour in all the spirits you can; tuck in a little soft paper, or rags, to stop the top ones from shifting about, and wrapping your bottles in paper or cloth put them in

a box, packing with sawdust if you can get it handy, if not with shavings, hay or grass, and send by the first express to their destination, that they may arrive before the spirits get weakened or the natural colors of the fish are lost or changed by the alcohol. As the Etheostomoids are all small fishes, common ale or junk bottles can be used in collecting or packing them up for sending away, as the specimens can be readily taken out by breaking off the neck of the bottle.

Common glycerine will answer the purpose of preserving the brilliant colors of the fishes, and it would be very desirable to have a few specimens of each kind put up in it for the purpose of making sure of the natural colors, though from its strong contracting powers specimens so preserved are not so good for general study as those put in alcohol. It would also be very desirable to have a number of specimens, especially if of brilliant colors, preserved so as to retain their colors, in the following way. Take the specimen as soon as dead and cut off a portion of one side, taking out the intestines and such of the flesh as you can take off by a simple cut, then pin it on a card, cut side down, and spread out the fins; then put on a thin coat of varnish, or, if no varnish is at hand, simply let the fish dry *in the shade*. By this simple method the natural colors will be preserved for a long time. By using a little care and putting cotton in the abdominal cavity and a little arsenic on the flesh, very handsome and interesting specimens can be made.

It often happens that a person obtains one or two specimens of a fish he would like to forward, but hardly thinks it worth while to send so small a lot by express. Such can readily be sent by mail at letter postage (three cents for every half ounce) by putting the specimens in a small tin or wooden box, with a little cotton or a rag that has been soaked in alcohol or glycerine and squeezed out (the specimen also having been first put in alcohol or spirits of some kind, or glycerine, for an hour or two). A specimen thus put up can be several days on the route without being injured.

In concluding my request for specimens of fishes of this family I beg to state that any other specimens would be very acceptable to our collection, and that any thing sent by express directed to the Peabody Academy of Science, Salem, Mass.,* will be most

*In sending specimens any express charges will be willingly paid on receipt by the Academy, and special arrangements will also be made to supply any person willing to collect for me with alcohol and jars.

thankfully received and acknowledged. I may also say that a copy of the "Monograph of the Etheostomoids," when published, will be furnished to all persons who kindly assist in the work by sending specimens; and that all notes on the habits, time of spawning, natural colors, etc., will be duly acknowledged in the work, which will form one of the series of illustrated monographs published by the Museum of Comparative Zoology. It is proposed to describe and figure every known species of the group.—F. W. PUTNAM, *Director Peabody Academy of Science, Salem, Mass.*

BUTTERFLY NOTES, 1871. —As bearing on the winter history of the species, an interesting capture of a much worn and faded female Archippus was made by me, May 12th, in this place—Amherst, Mass. The only Niphon taken during the season was found on May 18th. The 23rd, Vialis appeared and soon was very common. Phaeton was first seen June 5th, and, contrary to the usual reports, was not confined to a small locality, but became rather common in several directions from the village. June 9th, a single dimorphic female Hobomok was captured; suspecting it to be such and to have been described as Pochahontas and Quadaquina, I wrote to a distinguished lepidopterologist, who informed me that, on his pointing out the fact, Pochahontas was acknowledged by its author to be a dimorphic Hobomok; my specimen also agrees with a named Quadaquina received from a writer who has publicly stated his belief that it is the same as Pochahontas. July 8th, found Metacomet and Egeremet, males, abundant on Indian Hemp flowers and took Mopsus on an umbelliferous plant. Calanus (Westw.)—the *C. inorata* of Grote—was met with July 17th and Aug. 2nd. A single Delaware was taken by a neighbor in July. A harvest of butterflies was reaped, Aug. 2nd, on flowers of the mountain mint (*Pycnanthemum incanum*), at the foot of the Holyoke range; among them were Melinus, Mopsus, Smilacis and Edwardsii—the latter two very abundant, and the Edwardsii showing either a seasonal or regional variation from New York specimens, being smaller and the markings tending more to lines. On the top of the Holyoke range, Lucilius was frequent, and near the top a Portlandia confidently observed and the beautiful moth, *Callimorpha interrupto-marginata* taken. A visit in August to the Green Mountains in the region of Conway, Ashfield and Goshen, revealed nothing different from Amherst—none of the species that

might be set down as belonging to a Canadian fauna. The last butterfly of the season that is noteworthy was a single *Milberti*; frosts had come, and all the butterflies had disappeared except *Philodice*, *rapæ* and *Americanus*. In the course of the season, *Marcia* was frequent; it is not in the New England catalogue, perhaps because not regarded as distinct from *Tharos*. *Cybele* and *Aphrodite* were alike common, the latter the more so. A few unquestionable *Cybeles* had somewhat the red flush of *Aphrodite*. *Archippus* exceptionally very abundant. *Graptus* rare. *Sassacus* and *Mystic* common. Of the *Nisoniades*, some of my dates are: *Lucilius*, *Ennius*, *Juvenalis* and *Persius*, May 27th—the first also August 2nd, and the second also June 10th; *Icelus*, June 3rd and *Horatius* July 24th. The following New England butterflies have not been observed: *Protodice*, *Eurytheme*, *Lisa*, *Delia*, *Genutia*, *Epixanthe*, *Porsenna*, *Lucia*, *Clothilde*, *Acadica*, *strigosa*, *Angustus*, *Henrici*, *Atlantis*, *Montinus*, *Claudia*, *Nycteis*, *Harrisii*, *Cœnia*, *gracilis*, *Faunus*, *Semidea*, *Bachmanii*, *Catullus*, *Lycidas*, *Verna*, *Wingina*, *Acanootus*, *Manataqua*, *Manoco*, *Hianna*, *Panoquin*, *Mesapano*, *Logan*.—H. W. PARKER.

IOWA BUTTERFLIES.—To the lists hitherto published are to be added *Phaeton*, *Acadica*, *Thoe*, and the following *Hesperians*: *conspicua*, *Otho*, *Zabulon*, *Massasoit*, *Poweshiek*,—all from Central Iowa, namely *Poweshiek* and *Jasper* counties.—H. W. PARKER.

YOUNG OF THE BLIND FISH.—Dr. Hagen gives me the following information about the young specimens I mentioned (page 15) as belonging to Dr. Steindachner, which I just missed seeing before they were sent to Vienna. These specimens were procured by Dr. Hartung for Dr. Steindachner under the following circumstances. Just as Dr. Hartung was leaving the cave hotel on Oct. 21, a bottle was brought to him containing four specimens, one of which was smaller than the others (probably *Typhlichthys*), all living. He immediately transferred them to a jar containing alcohol and took no notice of them until he reached Nashville, when he discovered an addition of *eight little ones* in the jar.

The birth of these young was undoubtedly due to placing the parent in the alcohol, and the date (Oct. 21) would correspond to the time I stated in my paper as probably that at which the young were born.

Dr. Hagen states that he examined the young under a lens with-

out taking them from the jar and *could not discover any eyes*. The specimens were about three lines in length.

So now we have two more facts to add to the history of the blind fishes (though whether they apply to *Amblyopsis* or *Typhlichthys* is not yet settled). First, that the young are born in October, and second, that they are without external eyes when born.—F. W. PUTNAM.

G E O L O G Y .

GEOLOGY, ETC. IN CALIFORNIA.—At the regular meeting of the California Academy of Sciences Dec. 4th, Professor Whitney presented a variety of fossils found in limestones one hundred miles east of Elko. He then read a paper descriptive of his labors in the projection of a topographical map of the State, and exhibited several proofs or specimen copies to the members. They were most complete and elegantly engraved. He had commenced the publication of a volume on the geology of the State, and would probably compile three on the same topic. He also exhibited the first volume of the “*Birds of California*,” containing seven hundred illustrations. This, the first volume, was devoted to the land birds of the state. The “*Botany of California*” was also in preparation. It is not to be illustrated. Salvador Morthange, consul-general of Belgium, was introduced to the Academy and read a highly interesting paper on White Island, in the bay of Plenty, New Zealand.

Professor Marsh, of Yale College, made a few remarks on his recent explorations. He had been out since June from New Haven, and had spent two months in collecting vertebrate fossils. He had discovered probably about fifty new species from the Miocene and Pliocene deposits, embracing a large variety of extinct reptiles. In Eastern Oregon he had made discoveries which would seem to clear up the geological puzzle in regard to the fresh water lakes; and also a large number of fossil horses, some but two feet in height, and some of the two-toed type had been collected.

Dr. Blake read a paper on the water of the “*Devil’s Inkstand*,” at the Geysers, which he found to contain a large quantity of ammoniacal salts.—R. E. C. S.

ORIGIN OF THE NEW ENGLAND GLACIER.—Professor Dana contributes an important article to the “*American Journal of Science*”